St. John's River Benthic Community Assessment, 2001-2002

SUBMITTED TO:

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Center for Coastal Monitoring and Assessment
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INTRODUCTION

The St. John's River (SJR) was sampled during November, 2001 and March and July, 2002. One aspect of this evaluation was benthic community characterization, which was accomplished via sample collection by National Oceanic and Atmospheric Administration (NOAA) personnel and laboratory and data analysis by Barry A. Vittor & Associates, Inc. (BVA). Locations of the St. John's River stations are given in Figure 1 and Table 1.

METHODS

Sample Collection And Handling

A Young-modified Van Veen grab (area = 0.04 m^2) was used to collect bottom samples (three replicate samples) at each of the seven stations during November, 2001 and March and July, 2002. Macroinfaunal samples were sieved through a 0.5–mm mesh screen and preserved with 10% buffered formalin on ship. Macroinfaunal samples were transported to the BVA laboratory in Mobile, Alabama.

Sediment Analysis

Sediment texture was determined at half-phi intervals using the hydrometer technique for fractions smaller than 44 μm and nested sieves for larger particle fractions. Texture parameters that were computed included percent gravel, sand, and silt /clay. Total organic carbon (TOC) content was measured as ash-free dry weight expressed as a percentage.

Macroinfaunal Sample Analysis

In the laboratory of BVA, benthic samples were inventoried, rinsed gently through a 0.5 mm mesh sieve to remove preservatives and sediment, stained with Rose Bengal, and stored in 70% isopropanol solution until processing. Sample material (sediment, detritus, organisms) was placed in white enamel trays for sorting under Wild M-5A dissecting microscopes. All macroinvertebrates were carefully removed with forceps and placed in labeled glass vials containing 70% isopropanol. Each vial

represented a major taxonomic group (e.g. Polychaeta, Mollusca, Arthropoda). All sorted macroinvertebrates were identified to the lowest practical identification level (LPIL), which in most cases was to species level unless the specimen was a juvenile, damaged, or otherwise unidentifiable. The number of individuals of each taxon, excluding fragments, was recorded. A voucher collection was prepared, composed of representative individuals of each species not previously encountered in samples from the region.

DATA ANALYSIS

All data generated as a result of laboratory analysis of macroinfauna samples were first coded on data sheets. Enumeration data were entered for each species according to station and replicate. These data were reduced to a data summary report for each station, which included a taxonomic species list and benthic community parameters information. Archive data files of species identification and enumeration were prepared.

The Quality Assurance and Quality Control reports for the SJR samples are given in the Appendix.

Assemblage Structure

Several numerical indices were chosen for analysis and interpretation of the macroinfaunal data. Infaunal abundance is reported as the total number of individuals per station and the total number of individuals per square meter (= density). Taxa richness is reported as the average number of taxa represented in a given station collection.

Taxa diversity, which is often related to the ecological stability and environmental "quality" of the benthos, was estimated using Shannon's Index (Pielou, 1966), according to the following formula:

$$H' = -\sum_{i=1}^{s} p_i (ln\ p_i)$$

where, S = the number of taxa in the sample,

i = the i'th taxa in the sample, and

p_i = is the number of individuals of the i'th taxa divided by the total number of individuals in the sample.

Taxa diversity was calculated using ln; however, diversity may also be calculated using $\log_2$. Both methods of calculating diversity are common in the scientific literature. The taxa diversity calculated in this report using ln, can be converted to $\log_2$ diversity by multiplying the ln taxa diversity by 1.4427.

Taxa diversity within a given community is dependent upon the number of taxa present (taxa richness) and the distribution of all individuals among those taxa (equitability or evenness). In order to quantify and compare the equitability in the fauna to the taxa diversity for a given area, Pielou's Index J' (Pielou, 1966) was calculated as J' = H'/lnS, where $lnS = H'_{max}$, or the maximum possible diversity, when all taxa are represented by the same number of individuals; thus, $J' = H' / H'_{max}$.

HABITAT CHARACTERISTICS

November 2001

Sediment data for the 7 SJR stations in November are given in Table 1 and Figures 2 and 3. Sediment composition was > 95% sand at Stations 1, 6, and 7 and a sandy clay/clayey sand at Stations 2-5 (Table 1; Figure 2). The total organic carbon (TOC) fraction of the sediment was < 2% at Stations 1, 3, 5, 6 and 7; TOC was 5.5% and 7.6% at Stations 2 and 4 (Table 1; Figure 3).

March 2002

Sediment data for the 7 SJR stations in March are given in Table 1 and Figures 2 and 3. Sediment composition was > 95% sand at Stations 1, 6, and 7 and a sandy clay/clayey sand at Stations 2-5 (Table 1; Figure 2). The total organic carbon (TOC)

fraction of the sediment was uniformly low (< 3%) at all stations but Station 2 (9.2%) (Table 1; Figure 3).

July 2002

Sediment data for the 7 SJR stations in July are given in Table 1 and Figures 2 and 3. Sediment composition was > 95% sand at Stations 6 and 7 and a sandy clay/clayey sand/clay at Stations 1-5 (Table 1; Figure 2). The total organic carbon (TOC) fraction of the sediment was uniformly low (< 3%) at all stations (Table 1; Figure 3).

BENTHIC COMMUNITY CHARACTERIZATION

Microsoft ™Excel spreadsheets are being provided separately to NOAA which include: raw data on taxa abundance and density by replicate, a complete taxonomic listing with station abundance and occurrence, a major taxa table with overall taxa abundance, and an assemblage parameter table including data on mean number of taxa, mean density, taxa diversity and taxa evenness by station.

November 2001

A total of 475 organisms, representing 39 taxa, were identified from the 7 SJR stations (Table 2). Polychaetes were the most numerous organisms present representing 35.2% of the total assemblage, followed in abundance by bivalves (27.0%) and oligochaetes (20.1%). Polychaetes represented 35.9% of the total number of taxa followed by malacostracans (28.2%) and bivalves (15.4%) (Table 2).

The abundance of major taxa by station are given in Table 3 and Figure 4. The number of taxa per station ranged from 0 at Station 6 to 13 at Station 5. The number of organisms per station ranged from 0 at Station 6 to 222 at Station 3. In November, mollusks dominated the assemblage at Stations 1 and 2, annelids (polychaetes) dominated

at Stations 3, 4, and 5, and a mixed assemblage of annelids and arthropods dominated at Station 7 (Figure 4).

The dominant taxon collected from the SJR samples was the polychaete, *Streblospio benedicti* representing 21.9% of the total individuals collected (Table 4). Other dominant taxa included the oligochaete, *Tubificoides heterochaetus* and the bivalve, *Mytilopsis leucophaeata* representing 20.0% and 16.0% of the total assemblage, respectively. The polychaete, *Nereis* (LPIL) was the most widely distributed taxon being found at 57% of the stations (Table 4). The distribution of dominant taxa representing > 10% of the total assemblage at each station is given in Table 5.

Mean station taxa richness and station density data are given in Table 6 and Figures 5 and 6. Taxa richness varied and ranged from 0 at Station 6 to 8.0 (± 1.0) at Station 3 (Table 6; Figure 5). Station mean densities exhibited considerable variation ranging from 0 organisms/m^2 at Station 6 to 1850.0 organisms/m^2 (± 198.4) at Station 3 (Table 6; Figure 6).

Taxa diversity and evenness are given in Table 6 and Figures 7 and 8. Taxa diversity (H') ranged from 1.31 at Station 3 to 2.32 at Station 5 (Table 6; Figure 7). Taxa evenness (J') was generally high and values ranged from 0.53 at Station 2 to 0.91 at Station 5 (Table 6; Figure 8).

March 2002

A total of 407 organisms, representing 42 taxa, were identified from the 7 SJR stations in March (Table 2). Polychaetes were the most numerous organisms present representing 41.0% of the total assemblage, followed in abundance by bivalves (30.5%)

and insects (10.6%). Polychaetes represented 35.7% of the total number of taxa followed by malacostracans (23.8%) and bivalves (23.8%) (Table 2).

The abundance of major taxa by station are given in Table 3 and Figure 4. The number of taxa per station ranged from 5 at Station 2 to 25 at Station 5. The number of organisms per station ranged from 8 at Station 2 to 134 at Station 3. In March, mollusks dominated the assemblage at Station 1 and were co-dominant with annelids at Station 5; arthropods dominated at Station 2 and annelids dominated the assemblage at Stations 3, 4, 6, and 7 (Figure 4). Annelids dominated the assemblage at Stations 4 and 5 (Figure 4).

The dominant taxon collected from the SJR samples in March was the polychaete, *Streblospio benedicti* representing 12.6% of the total individuals collected, respectively (Table 4). The polychaetes, *Cirrophorus* sp. C, *Nereis* (LPIL), and *Nereis succinea*, the chironomid, *Coelotanypus* (LPIL), the bivalves, *Mytilopsis leucophaeata* and Mactridae (LPIL), and the oligochaete, *Tubificoides heterochaetus* were also abundant representing 9.5%, 7.4%, 7.4%, 8.0%, 7.4%, 6.8% and 6.0% of the total assemblage, respectively. *Streblospio benedicti* was the most widely distributed taxon being found at 71% of the stations (Table 4). The distribution of dominant taxa representing > 10% of the total assemblage at each station is given in Table 5.

Mean station taxa richness and station density data are given in Table 6 and Figures 5 and 6. Taxa richness varied and ranged from 2.0 (± 1.0) at Station 2 to 12.0 (± 4.6) at Station 5 (Table 6; Figure 5). Station mean densities exhibited considerable variation ranging from 66.7 organisms/m^2 (± 38.2) at Station 2 to 1116.7 organisms/m^2 (± 302.4) at Station 3 (Table 6; Figure 6).

Taxa diversity and evenness are given in Table 6 and Figures 7 and 8. Taxa diversity (H') ranged from 1.29 at Station 1 to 2.76 at Station 5 (Table 6; Figure 7). Taxa evenness (J') varied considerably and ranged from 0.52 at Station 7 to 0.94 at Station 6 (Table 6; Figure 8).

July 2002

A total of 409 organisms, representing 51 taxa, were identified from the 7 SJR stations (Table 2). Malacostracans were the most numerous organisms present representing 35.2% of the total assemblage, followed in abundance by polychaetes (22.3%), bivalves (19.3%) and gastropods (19.1%). Polychaetes represented 35.3% of the total number of taxa followed by malacostracans (31.4%) and bivalves (17.7%) (Table 2).

The abundance of major taxa by station are given in Table 3 and Figure 4. The number of taxa per station ranged from 5 at Station 3 to 18 at Station 7. The number of organisms per station ranged from 13 at Stations 3 and 6 to 168 at Station 5. In July, mollusks dominated the assemblage at Stations 1 and 2, and were co-dominant with arthropods at Station 7 (Figure 4). Annelids dominated the assemblage at Stations 3, 4 and 6, while arthropods dominated at Station 5 (Figure 4).

The dominant taxon collected from the SJR samples was the amphipod, *Apocorophium lacustre* representing 24.5% the total individuals collected (Table 4). The gastropod, *Texadina sphinctostoma*, and the polychaetes, *Streblospio benedicti* and *Nereis* (LPIL) were also common representing 18.6%, 7.3% and 7.1% of the total assemblage, respectively. *Streblospio benedicti* was the most widely distributed taxon being found at 57% of the stations (Table 4). The distribution of dominant taxa representing > 10% of the total assemblage at each station is given in Table 5.

Mean station taxa richness and station density data are given in Table 6 and Figures 5 and 6. Taxa richness varied and ranged from 2.3 (± 1.2) at Stations 3 and 6 to 8.0 (± 1.7) at Station 7 (Table 6; Figure 5). Station mean densities ranged from 108.3 organisms/m^2 at Stations 3 and 6 to 1400.0 organisms/m^2 (± 1733.7) at Station 5 (Table 6; Figure 6).

Taxa diversity and evenness are given in Table 6 and Figures 7 and 8. Taxa diversity (H') varied considerably and ranged from 1.24 at Station 1 to 2.40 at Station 7 (Table 6; Figure 7). Taxa evenness (J') ranged from 0.56 at Station 5 to 0.90 at Station 2 (Table 6; Figure 8).

LITERATURE CITED

Pielou, E.C. 1966. The measurement of diversity in different types of biological collections. Journal of Theoretical Biology 13:131-144.

Table 1. Summary of location, water quality and sediment data for the St. John's River stations, 2001-02.

Station	Sample Date	Latitude	Longitude	Depth (m)	Temp (C)	Salinity (ppt)	D.O. (mg/l)	pH	% T.O.C.	% Gravel	% Sand	% Silt	% Clay	% Silt + Clay	USACE Description	Median Particle Size (phi)	Sorting Coefficient	% Moisture
1	Nov 01	30° 08.97'	81°41.95'	4.50	21.06	0.40	6.38	7.57	1.58	0.00	95.69	-	-	4.31	Sand	2.509	0.456	39.54
2	Nov 01	30° 16.61'	81° 42.68'	2.20	21.39	1.12	6.43	7.56	7.62	0.00	38.95	26.34	34.71	61.05	Sandy Clay	5.831	4.117	60.84
3	Nov 01	30° 21.59'	81° 37.17'	4.10	20.60	1.15	6.74	7.58	1.81	0.00	64.70	12.80	22.50	35.30	Clayey Sand	3.559	3.790	40.60
4	Nov 01	30° 23.48'	81° 39.30'	3.00	21.33	3.36	6.17	7.58	5.54	0.00	51.07	17.60	31.33	48.93	Sandy Clay	3.878	4.781	46.15
5	Nov 01	30° 22.99'	81° 33.68'	9.20	19.89	27.53	6.00	7.98	1.05	0.00	60.51	11.66	27.84	39.50	Clayey Sand	3.118	4.864	35.80
6	Nov 01	30° 22.75'	81° 32.33'	3.10	20.33	17.03	6.54	7.91	0.06	0.00	99.86	-	-	0.14	Sand	2.548	0.383	21.05
7	Nov 01	30° 26.05'	81° 30.45'	1.90	20.89	12.26	6.00	7.68	0.51	0.00	98.47	-	-	1.53	Sand	2.501	0.388	25.91
1	Mar 02	30° 08.97'	81° 41.94'	4.7	22.07	0.49	7.75	7.54	1.38	0.00	97.52	-	-	2.48	Sand	2.591	0.514	37.05
2	Mar 02	30° 16.61'	81° 42.69'	2.2	24.16	1.10	8.62	7.69	9.17	0.00	56.05	12.42	31.53	43.95	Sandy Clay	3.634	5.209	66.29
3	Mar 02	30° 21.57'	81° 37.18'	2.5	21.91	5.57	8.43	7.31	2.12	0.00	60.67	16.92	22.41	39.33	Clayey Sand	3.519	3.521	44.60
4	Mar 02	30° 23.48'	81° 39.30'	2.8	21.73	10.00	7.59	7.47	2.97	0.00	47.77	19.79	32.44	52.23	Sandy Clay	4.936	4.357	46.51
5	Mar 02	30° 22.99'	81° 33.68'	4.2	21.21	14.51	7.97	7.62	1.01	0.00	67.81	7.42	24.77	32.19	Clayey Sand	3.313	4.763	32.12
6	Mar 02	30° 22.75'	81° 32.33'	2.0	21.10	16.63	7.69	7.68	0.03	0.00	99.79	-	-	0.21	Sand	2.547	0.397	20.70
7	Mar 02	30° 26.05'	81° 30.45'	2.4	22.81	19.17	7.51	7.49	0.46	0.00	99.34	-	-	0.66	Sand	2.107	0.728	22.85
1	Jul 02	30° 08.98'	81° 41.95'	5.9	29.40	1.10	5.80	7.20	0.97	0.00	77.75	7.33	14.92	22.25	Silty Sand	2.820	2.538	37.92
2	Jul 02	30° 16.61'	81° 42.68'	1.9	29.20	3.50	5.40	7.00	1.94	0.00	18.88	24.65	56.48	81.13	Clay	8.629	3.725	73.16
3	Jul 02	30° 21.58'	81° 37.18'	3.5	30.00	12.90	4.80	7.10	1.73	0.00	62.57	13.31	24.11	37.42	Clayey Sand	3.582	3.713	44.85
4	Jul 02	30° 23.47'	81° 39.30'	2.8	29.80	9.20	4.90	7.00	2.76	0.00	33.11	24.31	42.58	66.89	Sandy Clay	6.939	4.086	58.03
5	Jul 02	30° 22.99'	81° 31.70'	6.0	4.90	20.70	4.90	7.30	2.05	0.00	38.11	18.21	43.68	61.89	Sandy Clay	7.428	4.357	50.77
6	Jul 02	30° 22.75'	81° 32.33'	4.4	29.10	20.70	4.80	7.30	0.06	0.00	99.73	-	-	0.27	Sand	2.534	0.395	20.35
7	Jul 02	30° 24.31'	81° 30.50'	2.4	29.00	21.60	4.60	7.20	0.27	0.00	99.20	-	-	0.80	Sand	2.464	0.389	24.07

- unable to calculate due to amount of sample retained in sieve

Table 2. Summary of overall abundance of major benthic macroinfaunal taxonomic groups for St. John's River stations, 2001-2002.

November 2001

Taxa		Total No. Taxa	% of Total	Total No. Individuals	% of Total
Annelida					
	Oligochaeta	2	5.13	96	20.21
	Polychaeta	14	35.90	167	35.16
Mollusca					
	Bivalvia	6	15.38	128	26.95
	Gastropoda	1	2.56	6	1.26
Arthropoda					
	Insecta	3	7.69	46	9.68
	Malacostraca	11	28.21	25	5.26
Other Taxa		2	5.13	7	1.47
	Total	**39**		**475**	

March 2002

Taxa		Total No. Taxa	% of Total	Total No. Individuals	% of Total
Annelida					
	Oligochaeta	2	4.76	33	8.11
	Polychaeta	15	35.71	167	41.03
Mollusca					
	Bivalvia	10	23.81	124	30.47
Arthropoda					
	Insecta	3	7.14	43	10.57
	Malacostraca	10	23.81	29	7.13
Other Taxa		2	4.76	11	2.70
	Total	**42**		**407**	

Table 2 continued:

July 2002

Taxa		Total No. Taxa	% of Total	Total No. Individuals	% of Total
Annelida					
	Oligochaeta	1	1.96	1	0.24
	Polychaeta	18	35.29	91	22.25
Mollusca					
	Bivalvia	9	17.65	79	19.32
	Gastropoda	3	5.88	78	19.07
Arthropoda					
	Insecta	1	1.96	11	2.69
	Malacostraca	16	31.37	144	35.21
Echinodermata					
	Holothuroidea	1	1.96	1	0.24
Other Taxa		2	3.92	4	0.98
	Total	**51**		**409**	

Table 3. Summary of abundance of major benthic macroinfaunal taxonomic groups by station for St. John's River stations, 2001-2002.

Date	Station	Phylum	No. of Taxa	% of Total	No. of Individuals	% of Total
Nov 2001	**1**	Annelida	2	18.2	2	1.5
		Mollusca	5	45.5	94	68.6
		Arthropoda	4	36.4	41	29.9
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**11**		**137**	
	2	Annelida	0	0.0	0	0.0
		Mollusca	3	42.9	25	71.4
		Arthropoda	4	57.1	10	28.6
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**7**		**35**	
	3	Annelida	6	50.0	201	90.5
		Mollusca	1	8.3	4	1.8
		Arthropoda	4	33.3	15	6.8
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	8.3	2	0.9
		Total	**12**		**222**	
	4	Annelida	4	50.0	34	85.0
		Mollusca	2	25.0	2	5.0
		Arthropoda	1	12.5	1	2.5
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	12.5	3	7.5
		Total	**8**		**40**	
	5	Annelida	7	53.8	18	72.0
		Mollusca	2	15.4	3	12.0
		Arthropoda	3	23.1	3	12.0
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	7.7	1	4.0
		Total	**13**		**25**	
	6	Annelida	0	0.0	0	0.0
		Mollusca	0	0.0	0	0.0
		Arthropoda	0	0.0	0	0.0
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**0**		**0**	

Table 3 continued:

Date	Station	Phylum	No. of Taxa	% of Total	No. of Individuals	% of Total
	7	Annelida	5	62.5	8	50.0
		Mollusca	1	12.5	6	37.5
		Arthropoda	1	12.5	1	6.3
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	12.5	1	6.3
		Total	**8**		**16**	
March 02	**1**	Annelida	0	0.0	0	0.0
		Mollusca	2	22.2	39	46.4
		Arthropoda	7	77.8	45	53.6
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**9**		**84**	
	2	Annelida	2	40.0	2	25.0
		Mollusca	1	20.0	1	12.5
		Arthropoda	2	40.0	5	62.5
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**5**		**8**	
	3	Annelida	8	61.5	98	73.1
		Mollusca	2	15.4	31	23.1
		Arthropoda	2	15.4	3	2.2
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	7.7	2	1.5
		Total	**13**		**134**	
	4	Annelida	6	42.9	40	69.0
		Mollusca	2	14.3	3	5.2
		Arthropoda	5	35.7	11	19.0
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	7.1	4	6.9
		Total	**14**		**58**	
	5	Annelida	11	44.0	60	47.6
		Mollusca	7	28.0	50	39.7
		Arthropoda	5	20.0	11	8.7
		Echinoderma	0	0.0	0	0.0
		Other Taxa	2	8.0	5	4.0
		Total	**25**		**126**	
	6	Annelida	3	50.0	5	55.6
		Mollusca	0	0.0	0	0.0
		Arthropoda	1	16.7	2	22.2
		Echinoderma	0	0.0	0	0.0
		Other Taxa	2	33.3	2	22.2
		Total	**6**		**9**	

Table 3 continued:

Date	Station	Phylum	No. of Taxa	% of Total	No. of Individuals	% of Total
	7	Annelida	8	57.1	59	88.1
		Mollusca	1	7.1	1	1.5
		Arthropoda	5	35.7	7	10.4
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**14**		**67**	
July 02	**1**	Annelida	1	16.7	10	8.8
		Mollusca	3	50.0	94	82.5
		Arthropoda	2	33.3	10	8.8
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**6**		**114**	
	2	Annelida	1	16.7	8	25.0
		Mollusca	3	50.0	20	62.5
		Arthropoda	1	16.7	2	6.3
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	16.7	2	6.3
		Total	**6**		**32**	
	3	Annelida	4	80.0	12	92.3
		Mollusca	0	0.0	0	0.0
		Arthropoda	0	0.0	0	0.0
		Echinoderma	0	0.0	0	0.0
		Other Taxa	1	20.0	1	7.7
		Total	**5**		**13**	
	4	Annelida	3	42.9	12	52.2
		Mollusca	1	14.3	7	30.4
		Arthropoda	3	42.9	4	17.4
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**7**		**23**	
	5	Annelida	7	43.8	32	19.0
		Mollusca	2	12.5	11	6.5
		Arthropoda	7	43.8	125	74.4
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**16**		**168**	
	6	Annelida	4	66.7	9	69.2
		Mollusca	2	33.3	4	30.8
		Arthropoda	0	0.0	0	0.0
		Echinoderma	0	0.0	0	0.0
		Other Taxa	0	0.0	0	0.0
		Total	**6**		**13**	
	7	Annelida	5	27.8	9	19.6
		Mollusca	5	27.8	21	45.7
		Arthropoda	6	33.3	14	30.4
		Echinoderma	1	5.6	1	2.2
		Other Taxa	1	5.6	1	2.2
		Total	**18**		**46**	

Table 4. Abundance and distribution of taxa for the St. John's River, 2001-2002.

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
November 2001							
Streblospio benedicti	Ann	Poly	104	21.89	21.89	2	29
Tubificoides heterochaetus	Ann	Olig	95	20.00	41.89	2	29
Mytilopsis leucophaeata	Mol	Biva	76	16.00	57.89	2	29
Coelotanypus (LPIL)	Art	Inse	42	8.84	66.74	2	29
Nereis (LPIL)	Ann	Poly	26	5.47	72.21	4	57
Macoma mitchelli	Mol	Biva	20	4.21	76.42	2	29
Rangia cuneata	Mol	Biva	18	3.79	80.21	3	43
Capitella capitata	Ann	Poly	8	1.68	81.89	1	14
Monoculodes sp. D	Art	Mala	8	1.68	83.58	1	14
Nereis succinea	Ann	Poly	8	1.68	85.26	2	29
Bivalvia (LPIL)	Mol	Biva	7	1.47	86.74	3	43
Mediomastus (LPIL)	Ann	Poly	7	1.47	88.21	2	29
Acteocina canaliculata	Mol	Gast	6	1.26	89.47	1	14
Rhynchocoela (LPIL)	Rhy	-	6	1.26	90.74	3	43
Geukensia demissa	Mol	Biva	5	1.05	91.79	2	29
Panopeus herbstii	Art	Mala	4	0.84	92.63	2	29
Edotea triloba	Art	Mala	3	0.63	93.26	1	14
Magelona sp. H	Ann	Poly	3	0.63	93.89	1	14
Scoloplos rubra	Ann	Poly	3	0.63	94.53	2	29
Chironomidae (LPIL)	Art	Inse	2	0.42	94.95	1	14
Cryptochironomus (LPIL)	Art	Inse	2	0.42	95.37	2	29
Cyathura polita	Art	Mala	2	0.42	95.79	1	14
Nereis micromma	Ann	Poly	2	0.42	96.21	1	14
Sphenia antillensis	Mol	Biva	2	0.42	96.63	1	14
Synidotea sp. F	Art	Mala	2	0.42	97.05	1	14
Capitella (LPIL)	Ann	Poly	1	0.21	97.26	1	14
Cyclaspis varians	Art	Mala	1	0.21	97.47	1	14
Decapoda (LPIL)	Art	Mala	1	0.21	97.68	1	14
Grandidierella bonnieroides	Art	Mala	1	0.21	97.89	1	14
Heteromastus filiformis	Ann	Poly	1	0.21	98.11	1	14
Leucon americanus	Art	Mala	1	0.21	98.32	1	14
Melita longisetosa	Art	Mala	1	0.21	98.53	1	14
Ogyrides alphaerostris	Art	Mala	1	0.21	98.74	1	14
Paraprionospio pinnata	Ann	Poly	1	0.21	98.95	1	14
Prionospio (LPIL)	Ann	Poly	1	0.21	99.16	1	14
Sigambra tentaculata	Ann	Poly	1	0.21	99.37	1	14
Spionidae (LPIL)	Ann	Poly	1	0.21	99.58	1	14
Tubificidae (LPIL)	Ann	Olig	1	0.21	99.79	1	14
Tubulanus (LPIL)	Rhy	Anop	1	0.21	100.00	1	14
March 2002							
Streblospio benedicti	Ann	Poly	61	12.55	12.55	5	71
Cirrophorus sp. C	Ann	Poly	46	9.47	22.02	1	14
Coelotanypus (LPIL)	Art	Inse	39	8.02	30.04	2	29
Mytilopsis leucophaeata	Mol	Biva	36	7.41	37.45	1	14
Nereis (LPIL)	Ann	Poly	36	7.41	44.86	3	43
Nereis succinea	Ann	Poly	36	7.41	52.26	3	43
Mactridae (LPIL)	Mol	Biva	33	6.79	59.05	2	29
Tubificoides heterochaetus	Ann	Olig	29	5.97	65.02	2	29
Abra aequalis	Mol	Biva	20	4.12	69.14	1	14

Table 4 continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
Bivalvia (LPIL)	Mol	Biva	19	3.91	73.05	3	43
Corophiidae (LPIL)	Art	Mala	13	2.67	75.72	3	43
Mediomastus (LPIL)	Ann	Poly	12	2.47	78.19	2	29
Rhynchocoela (LPIL)	Rhy	-	11	2.26	80.45	4	57
Asabellides oculata	Ann	Poly	9	1.85	82.30	1	14
Sphenia antillensis	Mol	Biva	6	1.23	83.54	1	14
Phyllodocidae (LPIL)	Ann	Poly	5	1.03	84.57	2	29
Grandidierella bonnieroides	Art	Mala	4	0.82	85.39	1	14
Rangia cuneata	Mol	Biva	4	0.82	86.21	2	29
Sabellaria vulgaris	Ann	Poly	4	0.82	87.04	1	14
Tubificidae (LPIL)	Ann	Olig	4	0.82	87.86	2	29
Capitella capitata	Ann	Poly	3	0.62	88.48	1	14
Oxyurostylis (LPIL)	Art	Mala	3	0.62	89.09	1	14
Panopeus herbstii	Art	Mala	3	0.62	89.71	1	14
Paraonis (LPIL)	Ann	Poly	3	0.62	90.33	1	14
Polypedilum scalaenum gr	Art	Inse	3	0.62	90.95	2	29
Amphipoda (LPIL)	Art	Mala	2	0.41	91.36	2	29
Amygdalum papyria	Mol	Biva	2	0.41	91.77	1	14
Cirrophorus (LPIL)	Ann	Poly	2	0.41	92.18	1	14
Cyathura polita	Art	Mala	2	0.41	92.59	1	14
Hargeria rapax	Art	Mala	2	0.41	93.00	2	29
Marenzellaria viridis	Ann	Poly	2	0.41	93.42	1	14
Mytilidae (LPIL)	Mol	Biva	2	0.41	93.83	1	14
Oxyurostylis smithi	Art	Mala	2	0.41	94.24	1	14
Paraonis fulgens	Ann	Poly	2	0.41	94.65	2	29
Rhithropanopeus harrisii	Art	Mala	2	0.41	95.06	2	29
Tubulanus (LPIL)	Rhy	Anop	2	0.41	95.47	2	29
Xanthidae (LPIL)	Art	Mala	2	0.41	95.88	2	29
Acteocina canaliculata	Mol	Gast	1	0.21	96.09	1	14
Ampharetidae (LPIL)	Ann	Poly	1	0.21	96.30	1	14
Arcidae (LPIL)	Mol	Biva	1	0.21	96.50	1	14
Automate (LPIL)	Art	Mala	1	0.21	96.71	1	14
Cryptochironomus (LPIL)	Art	Inse	1	0.21	96.91	1	14
Cyclaspis varians	Art	Mala	1	0.21	97.12	1	14
Dipolydora socialis	Ann	Poly	1	0.21	97.33	1	14
Edotea triloba	Art	Mala	1	0.21	97.53	1	14
Exogone (LPIL)	Ann	Poly	1	0.21	97.74	1	14
Geukensia demissa	Mol	Biva	1	0.21	97.94	1	14
Glyceridae (LPIL)	Ann	Poly	1	0.21	98.15	1	14
Haustoriidae (LPIL)	Art	Mala	1	0.21	98.35	1	14
Laeonereis culveri	Ann	Poly	1	0.21	98.56	1	14
Monoculodes sp. D	Art	Mala	1	0.21	98.77	1	14
Nereis micromma	Ann	Poly	1	0.21	98.97	1	14
Polydora cornuta	Ann	Poly	1	0.21	99.18	1	14
Scoloplos rubra	Ann	Poly	1	0.21	99.38	1	14
Spionidae (LPIL)	Ann	Poly	1	0.21	99.59	1	14
Spiophanes bombyx	Ann	Poly	1	0.21	99.79	1	14
Upogebia affinis	Art	Mala	1	0.21	100.00	1	14

Table 4 continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
July 2002							
Apocorophium lacustre	Art	Mala	100	24.45	24.45	1	14
Texadina sphinctostoma	Mol	Gast	76	18.58	43.03	2	29
Streblospio benedicti	Ann	Poly	30	7.33	50.37	4	57
Nereis (LPIL)	Ann	Poly	29	7.09	57.46	2	29
Mytilopsis leucophaeata	Mol	Biva	22	5.38	62.84	1	14
Macoma mitchelli	Mol	Biva	14	3.42	66.26	2	29
Bivalvia (LPIL)	Mol	Biva	12	2.93	69.19	1	14
Coelotanypus (LPIL)	Art	Inse	11	2.69	71.88	2	29
Corophiidae (LPIL)	Art	Mala	10	2.44	74.33	1	14
Rangia cuneata	Mol	Biva	10	2.44	76.77	3	43
Xanthidae (LPIL)	Art	Mala	9	2.20	78.97	1	14
Ampelisca cristata	Art	Mala	7	1.71	80.68	1	14
Mulinia lateralis	Mol	Biva	6	1.47	82.15	1	14
Paraonis fulgens	Ann	Poly	6	1.47	83.62	1	14
Sphenia antillensis	Mol	Biva	6	1.47	85.09	1	14
Amygdalum papyria	Mol	Biva	5	1.22	86.31	1	14
Dipolydora socialis	Ann	Poly	4	0.98	87.29	2	29
Panopeus herbstii	Art	Mala	4	0.98	88.26	2	29
Ampelisca (LPIL)	Art	Mala	3	0.73	89.00	1	14
Heteromastus filiformis	Ann	Poly	3	0.73	89.73	1	14
Macoma (LPIL)	Mol	Biva	3	0.73	90.46	1	14
Paraprionospio pinnata	Ann	Poly	3	0.73	91.20	1	14
Rhynchocoela (LPIL)	Rhy	-	3	0.73	91.93	2	29
Leitoscoloplos (LPIL)	Ann	Poly	2	0.49	92.42	2	29
Marphysa (LPIL)	Ann	Poly	2	0.49	92.91	1	14
Melita longisetosa	Art	Mala	2	0.49	93.40	1	14
Nereis succinea	Ann	Poly	2	0.49	93.89	1	14
Sabellaria vulgaris	Ann	Poly	2	0.49	94.38	1	14
Acteocina canaliculata	Mol	Gast	1	0.24	94.62	1	14
Actiniaria (LPIL)	Cni	Anth	1	0.24	94.87	1	14
Americhelidium americanum	Art	Mala	1	0.24	95.11	1	14
Automate (LPIL)	Art	Mala	1	0.24	95.35	1	14
Capitella capitata	Ann	Poly	1	0.24	95.60	1	14
Chione cancellata	Mol	Biva	1	0.24	95.84	1	14
Cirrophorus sp. C	Ann	Poly	1	0.24	96.09	1	14
Cyathura polita	Art	Mala	1	0.24	96.33	1	14
Decapoda (LPIL)	Art	Mala	1	0.24	96.58	1	14
Edotea triloba	Art	Mala	1	0.24	96.82	1	14
Eunicidae (LPIL)	Ann	Poly	1	0.24	97.07	1	14
Grandidierella bonnieroides	Art	Mala	1	0.24	97.31	1	14
Ilyanassa obsoleta	Mol	Gast	1	0.24	97.56	1	14
Leitoscoloplos robustus	Ann	Poly	1	0.24	97.80	1	14
Leptosynapta tenuis	Ech	Holo	1	0.24	98.04	1	14
Mediomastus (LPIL)	Ann	Poly	1	0.24	98.29	1	14
Monoculodes sp. D	Art	Mala	1	0.24	98.53	1	14
Owenia fusiformis	Ann	Poly	1	0.24	98.78	1	14
Pagurus longicarpus	Art	Mala	1	0.24	99.02	1	14
Rhithropanopeus harrisii	Art	Mala	1	0.24	99.27	1	14
Serpulidae (LPIL)	Ann	Poly	1	0.24	99.51	1	14
Syllis beneliahui	Ann	Poly	1	0.24	99.76	1	14
Tubificidae (LPIL)	Ann	Olig	1	0.24	100.00	1	14

Taxa Key

Ann = Annelida
- Olig = Oligochaeta
- Poly = Polychaeta

Art = Arthropoda
- Inse = Insecta
- Mala = Malacostraca

Cni = Cnidaria
- Anth = Anthozoa

Ech = Echinodermata
- Holo = Holothuroidea

Mol = Mollusca
- Biva = Bivalvia
- Gast = Gastropoda

Rhy = Rhynchocoela

Table 5. Percentage abundance of dominant benthic macroinfaunal taxa (>10% of the total) for the St. John's River stations, 2001-2002.

November 2001				**Station**			
Taxa	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Annelida							
Oligochaeta							
Tubificoides heterochaetus			41.0	10.0			
Polychaeta							
Magelona sp. H					12.0		
Mediomastus (LPIL)					16.0		18.8
Nereis (LPIL)				55.0			
Nereis succinea				17.5			
Scoloplos rubra							12.5
Streblospio benedicti			44.1		24.0		
Arthropoda							
Insecta							
Coelotanypus (LPIL)	26.3	17.1					
Mollusca							
Bivalvia							
Macoma mitchelli		40.0					
Mytilopsis leucophaeata	54.0						
Rangia cuneata		25.7					
Gastropoda							
Acteocina canaliculata							37.5

Table 5 continued:

March 2002	**Station**						
Taxa	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Annelida							
Oligochaeta							
Tubificidae (LPIL)		12.5					
Tubificoides heterochaetus			20.9				
Polychaeta							
Cirrophorus sp. C							68.7
Laeonereis culveri						11.1	
Nereis (LPIL)				31.0	13.5		
Nereis succinea				25.9			
Paraonis (LPIL)						33.3	
Paraonis fulgens						11.1	
Streblospio benedicti		12.5	38.8				
Arthropoda							
Insecta							
Coelotanypus (LPIL)	41.7	50.0					
Polypedilum scalaenum grp		12.5					
Malacostraca							
Oxyurostylis smithi						22.2	
Mollusca							
Bivalvia							
Abra aequalis					15.9		
Mactridae (LPIL)			15.7				
Mytilopsis leucophaeata	42.9						
Rangia cuneata		12.5					
Rhynchocoela							
Anopla							
Tubulanus (LPIL)						11.1	

Table 5 continued:

July 2002	**Station**						
Taxa	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Annelida							
Polychaeta							
Heteromastus filiformis				13.0			
Nereis (LPIL)				30.4	13.1		
Paraonis fulgens						46.2	
Paraprionospio pinnata			23.1				
Streblospio benedicti		25.0	53.8				10.9
Arthropoda							
Malacostraca							
Ampelisca cristata							15.2
Apocorophium lacustre					59.5		
Mollusca							
Bivalvia							
Bivalvia (LPIL)							26.1
Macoma (LPIL)						23.1	
Macoma mitchelli		21.9		30.4			
Mulinia lateralis							13.0
Mytilopsis leucophaeata	19.3						
Gastropoda							
Texadina sphinctostoma	57.9	31.3					

Table 6. Summary of benthic macroinfaunal data for the St. John's River stations, 2001-2002.

Date	Station	Rep	Taxa	Indvs	Density	Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	H' Diversity	J' Evenness
Nov 2001	**1**	1	8	40	1000	7.0	1.0	1141.7	359.1	11	1.38	0.58
		2	7	35	875							
		3	6	62	1550							
	2	1	4	17	425	5.0	1.0	291.7	125.8	7	1.55	0.80
		2	6	11	275							
		3	5	7	175							
	3	1	8	71	1775	8.0	1.0	1850.0	198.4	12	1.31	0.53
		2	7	68	1700							
		3	9	83	2075							
	4	1	5	10	250	4.3	1.2	333.3	166.5	8	1.43	0.69
		2	5	21	525							
		3	3	9	225							
	5	1	8	9	225	6.3	2.9	208.3	52.0	13	2.32	0.91
		2	8	10	250							
		3	3	6	150							
	6	1	0	0	0	0.0	0.0	0.0	0.0	0	0.00	0.00
		2	0	0	0							
		3	0	0	0							
	7	1	3	5	125	3.3	0.6	133.3	38.2	8	1.81	0.87
		2	4	7	175							
		3	3	4	100							

Table 6 continued:

Date	Station	Rep	Taxa	Indvs	Density	Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	H' Diversity	J' Evenness
March 2002	**1**	1	22	22	550	5.3	2.1	700.0	238.5	9	1.29	0.59
		2	23	23	575							
		3	39	39	975							
	2	1	4	4	100	2.0	1.0	66.7	38.2	5	1.39	0.86
		2	1	1	25							
		3	3	3	75							
	3	1	54	54	1350	8.7	0.6	1116.7	302.4	13	1.79	0.70
		2	31	31	775							
		3	49	49	1225							
	4	1	34	34	850	7.7	2.5	483.3	351.2	14	2.07	0.78
		2	18	18	450							
		3	6	6	150							
	5	1	23	23	575	12.0	4.6	1050.0	433.7	25	2.76	0.86
		2	46	46	1150							
		3	57	57	1425							
	6	1	2	2	50	2.3	0.6	75.0	25.0	6	1.68	0.94
		2	3	3	75							
		3	4	4	100							
	7	1	41	41	1025	6.7	0.6	558.3	416.3	14	1.37	0.52
		2	17	17	425							
		3	9	9	225							

Table 6 continued:

Date	Station	Rep	Taxa	Indvs	Density	Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	H' Diversty	J' Evenness
July 2002	**1**	1	5	34	850	4.7	0.6	950.0	631.0	6	1.24	0.69
		2	5	15	375							
		3	4	65	1625							
	2	1	4	8	200	4.7	0.6	266.7	62.9	6	1.61	0.90
		2	5	13	325							
		3	5	11	275							
	3	1	3	8	200	2.3	1.2	108.3	87.8	5	1.26	0.79
		2	1	1	25							
		3	3	4	100							
	4	1	5	10	250	3.7	1.2	191.7	52.0	7	1.69	0.87
		2	3	6	150							
		3	3	7	175							
	5	1	7	19	475	7.3	2.5	1400.0	1733.7	16	1.56	0.56
		2	5	13	325							
		3	10	136	3400							
	6	1	1	1	25	2.3	1.2	108.3	76.4	6	1.48	0.83
		2	3	7	175							
		3	3	5	125							
	7	1	9	19	475	8.0	1.7	383.3	158.8	18	2.40	0.83
		2	9	19	475							
		3	6	8	200							

Figure 1. Locations of the NOAA St. John's River stations, 2001-2002.

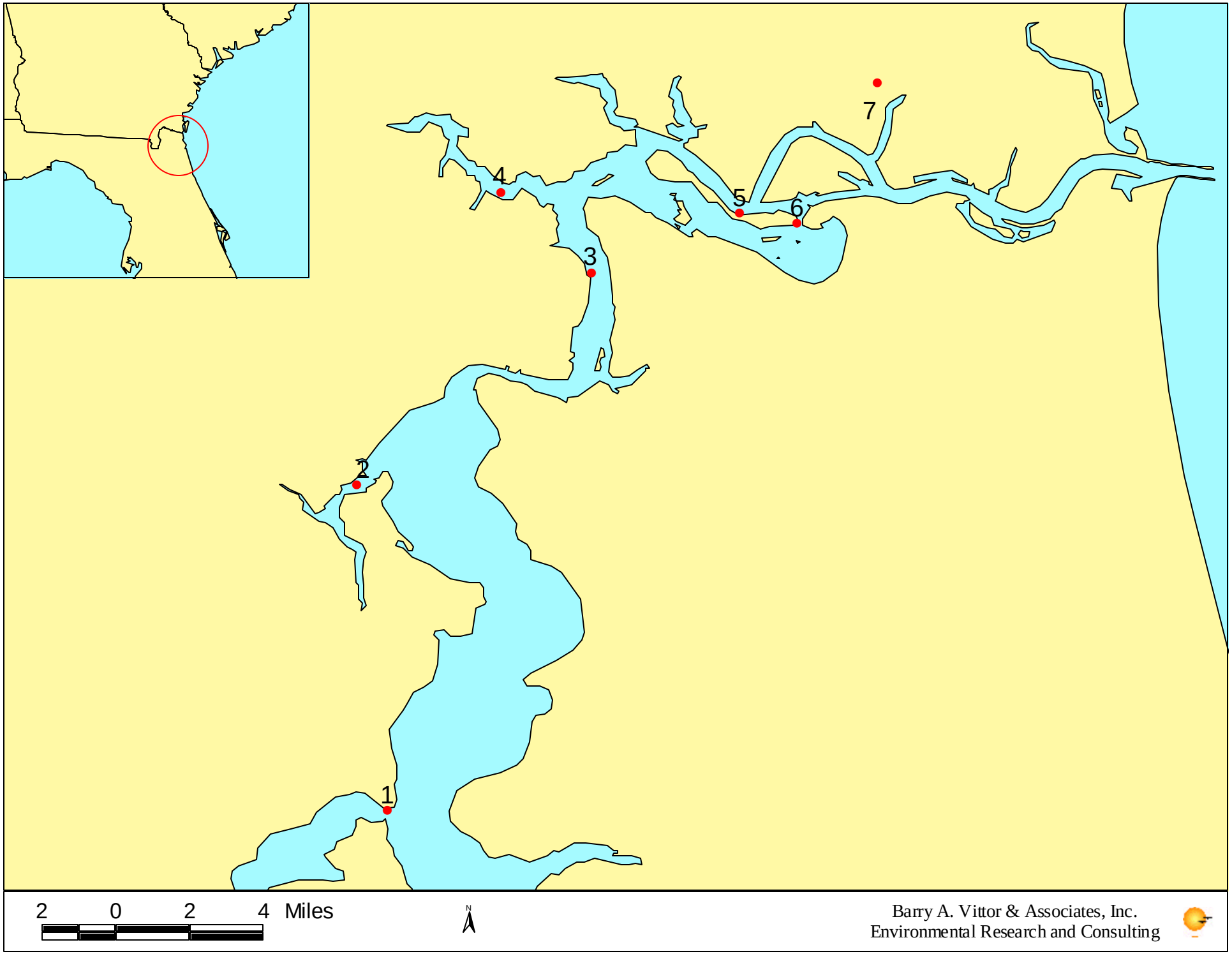


Figure 2. Sediment texture data for the NOAA St. John's River stations, 2001-2002.

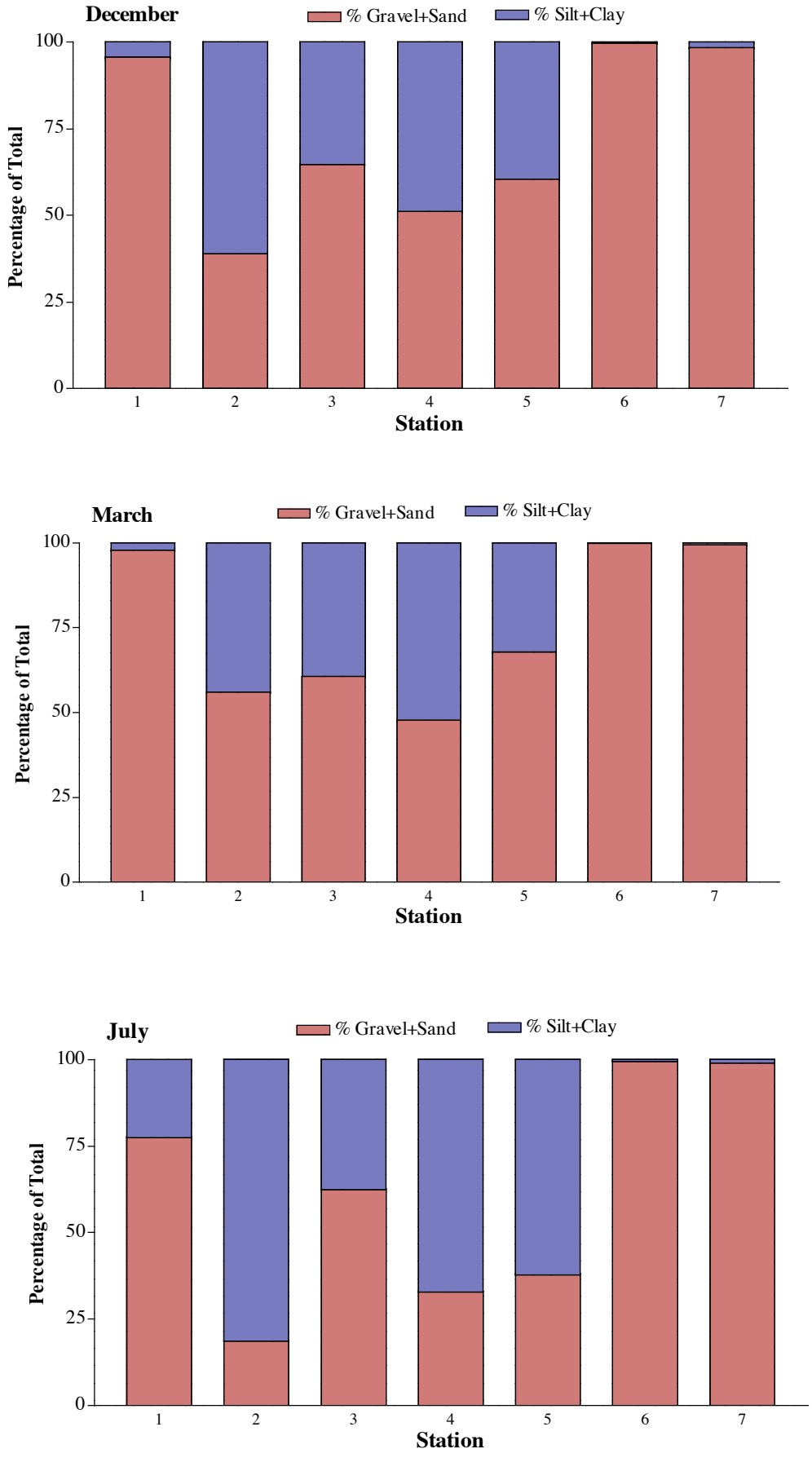
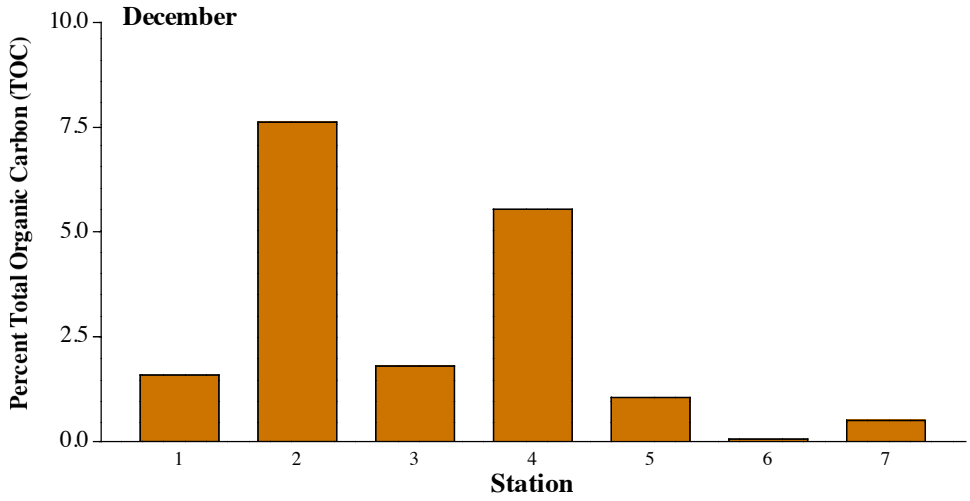
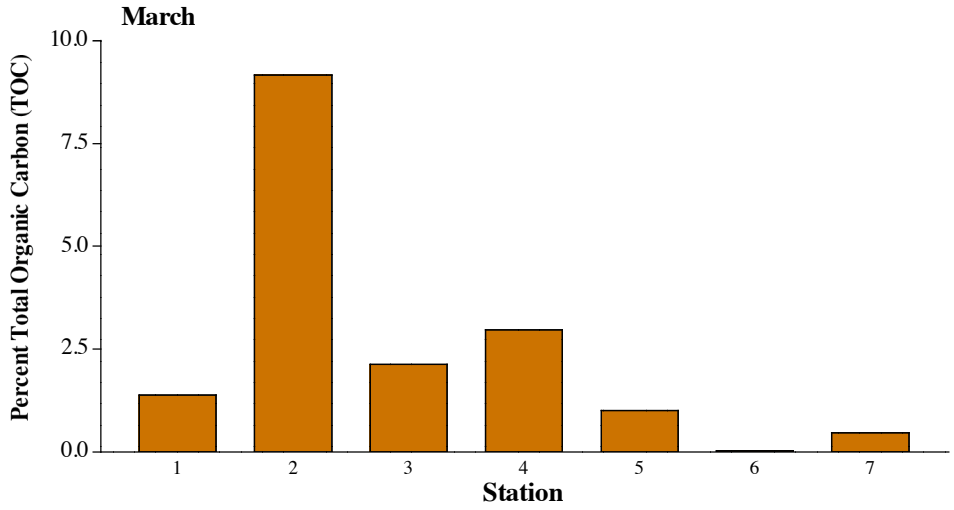


Figure 3. Sediment percent organic carbon (TOC) for the NOAA St. John's River stations, 2001-2002.





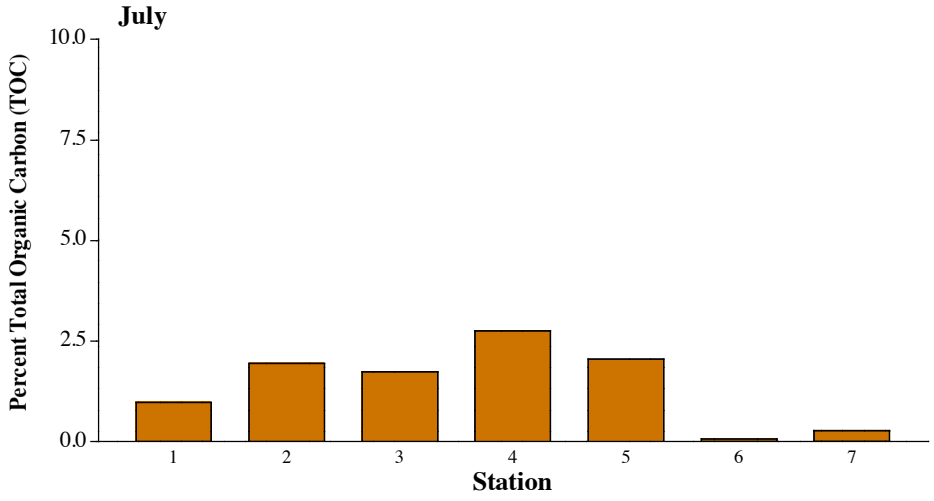


Figure 4. Major macroinvertebrate taxonomic groups for the NOAA St. John's River stations, 2001-2002.

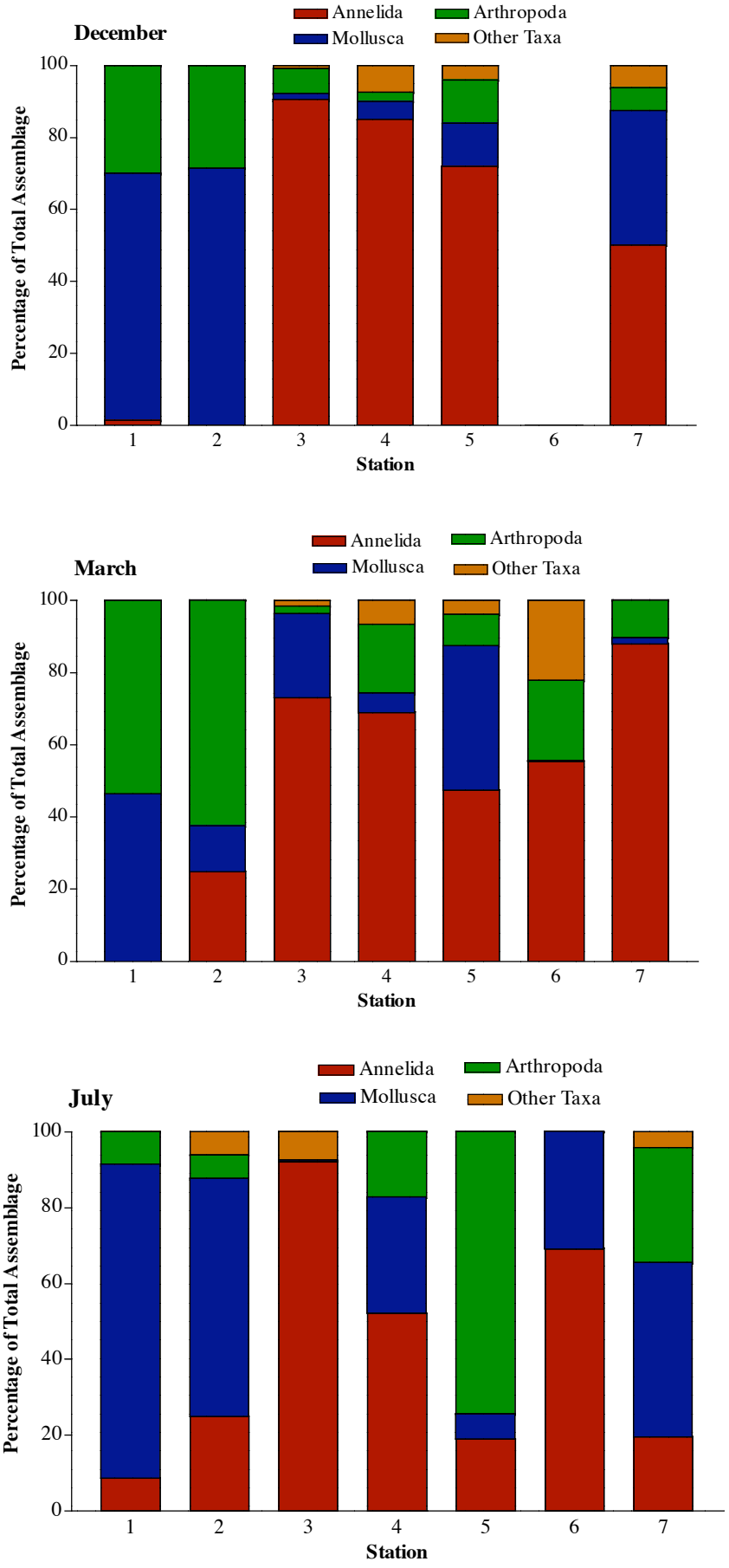


Figure 5. Macroinvertebrate taxa richness for the NOAA St. John's River stations, 2001-2002.

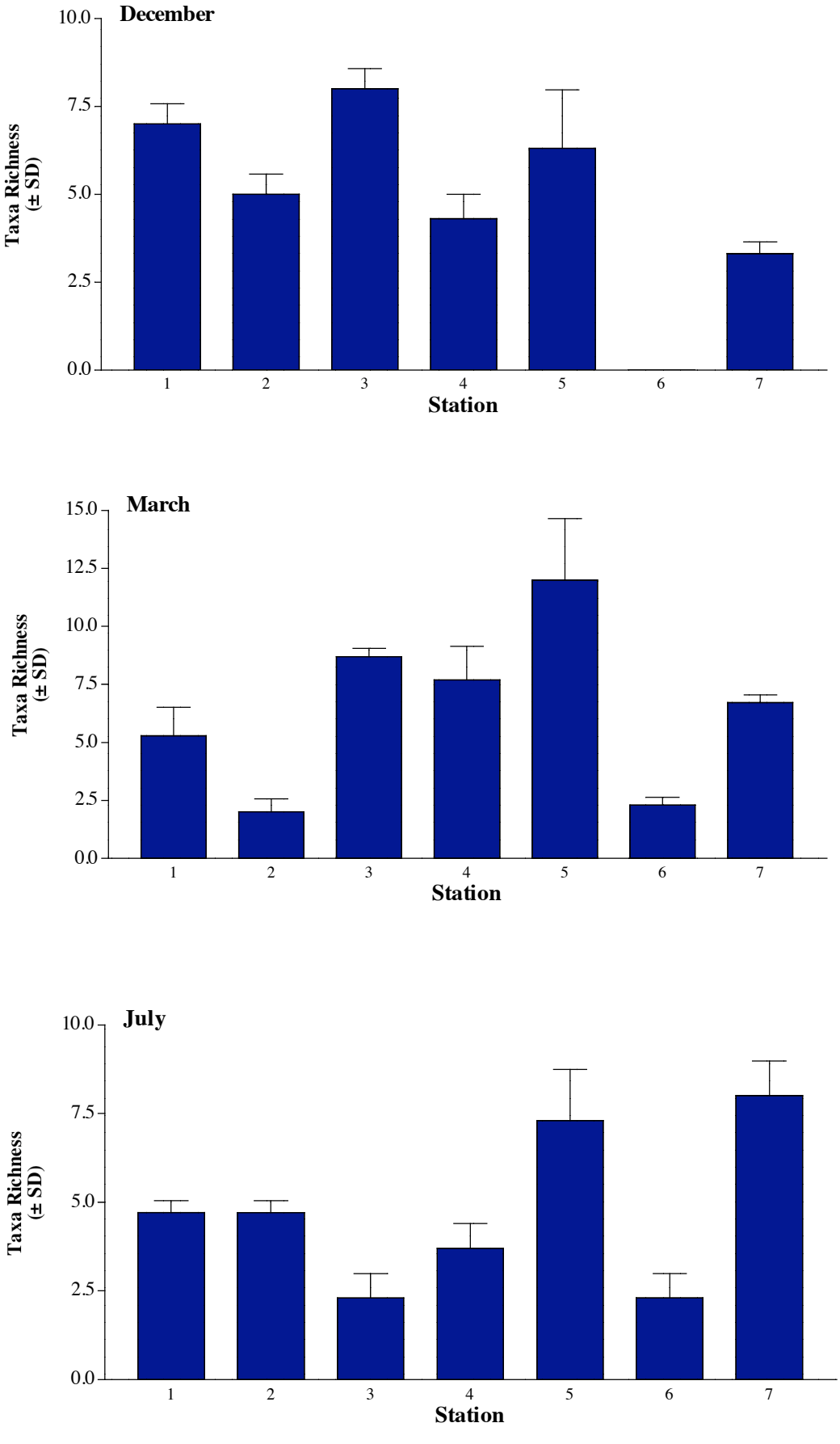


Figure 6. Macroinvertebrate densities for the NOAA St. John's River stations, 2001-2002.

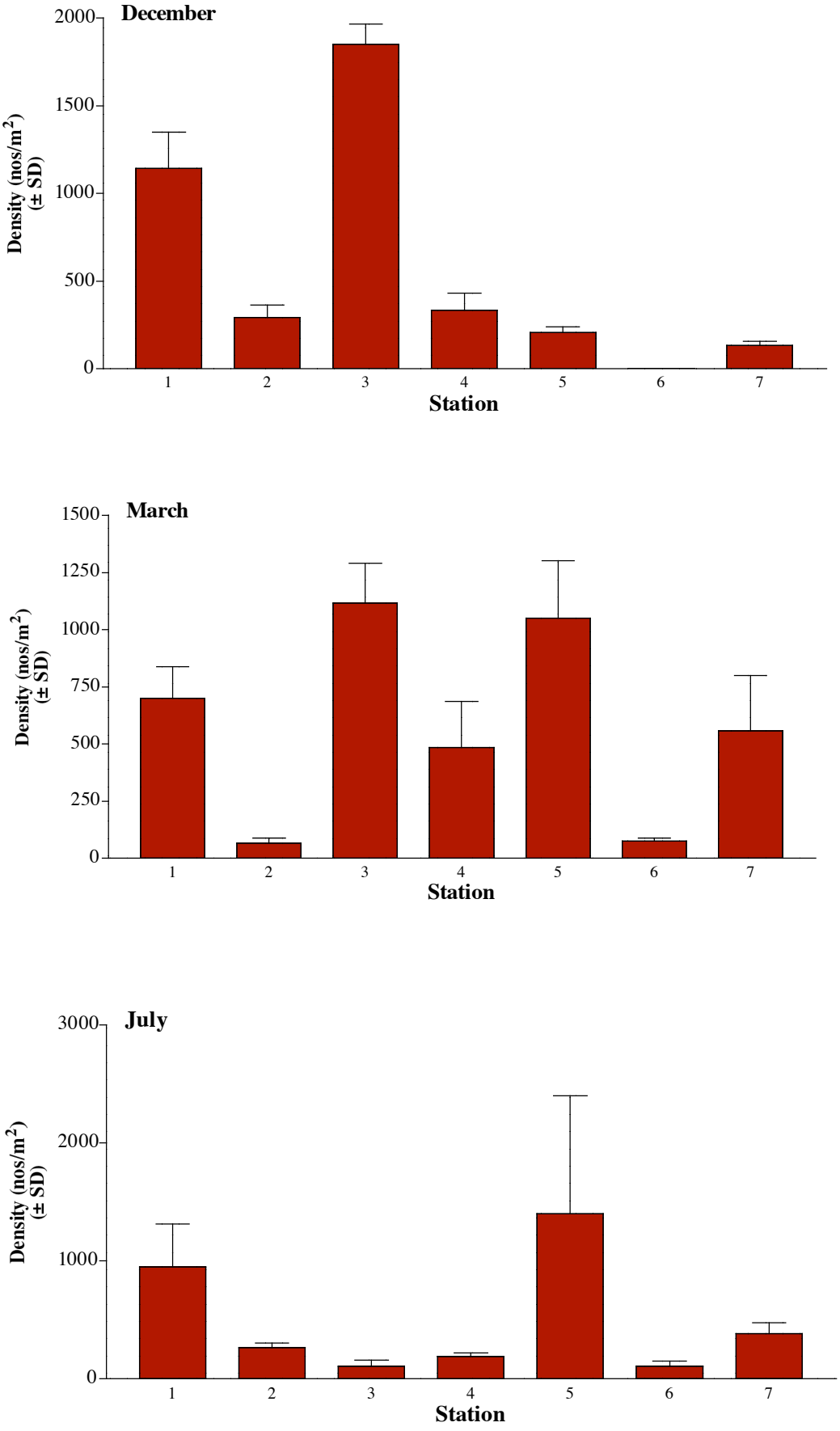
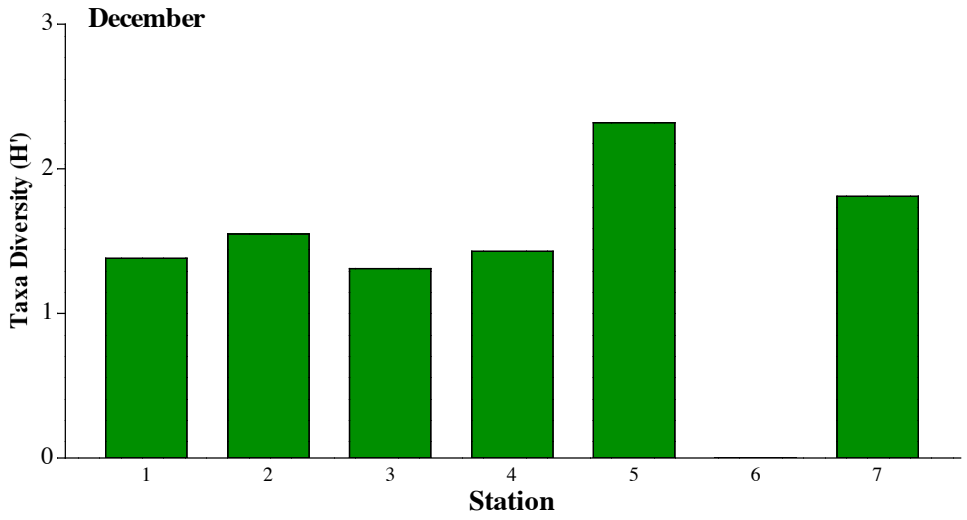
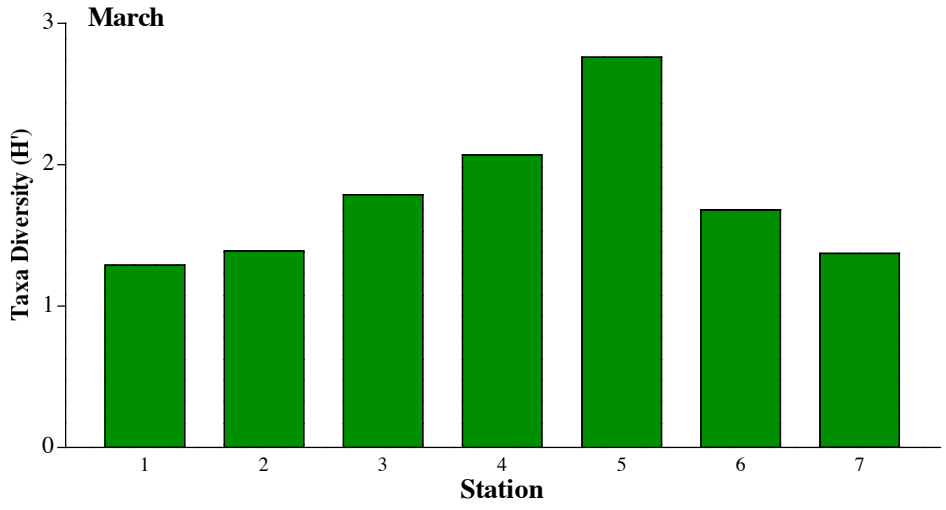


Figure 7. Taxa diversity (H') for the NOAA St. John's River stations, 2001-2002.





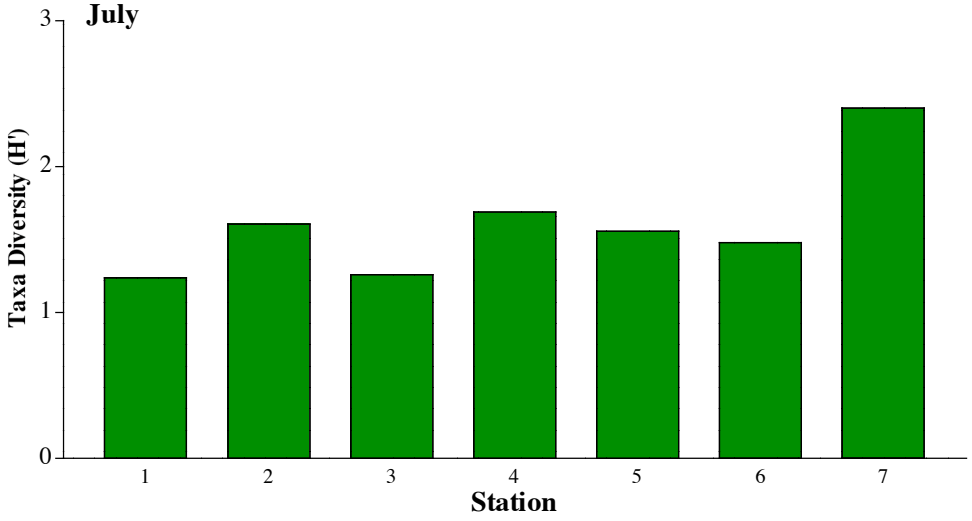
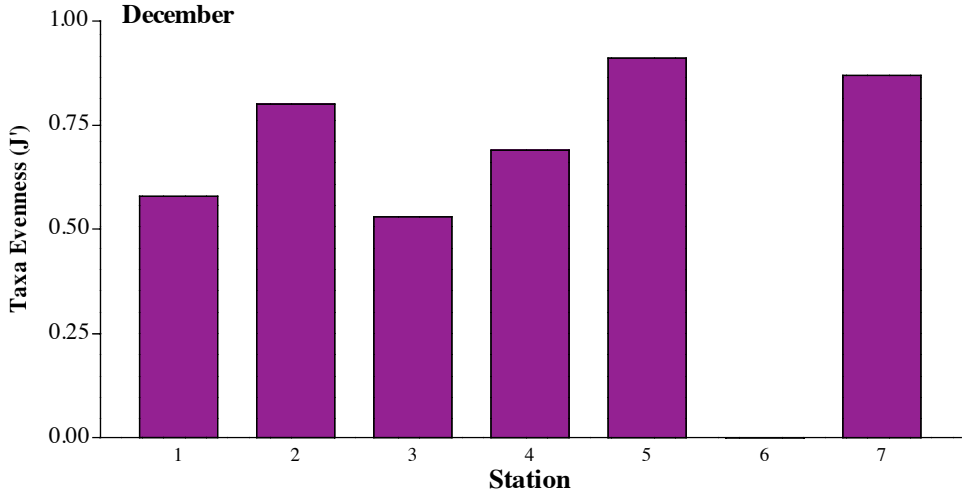
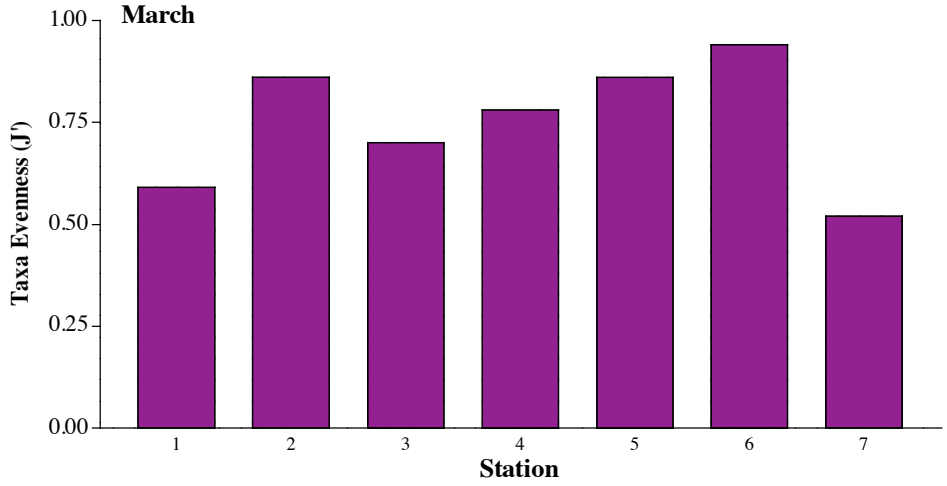
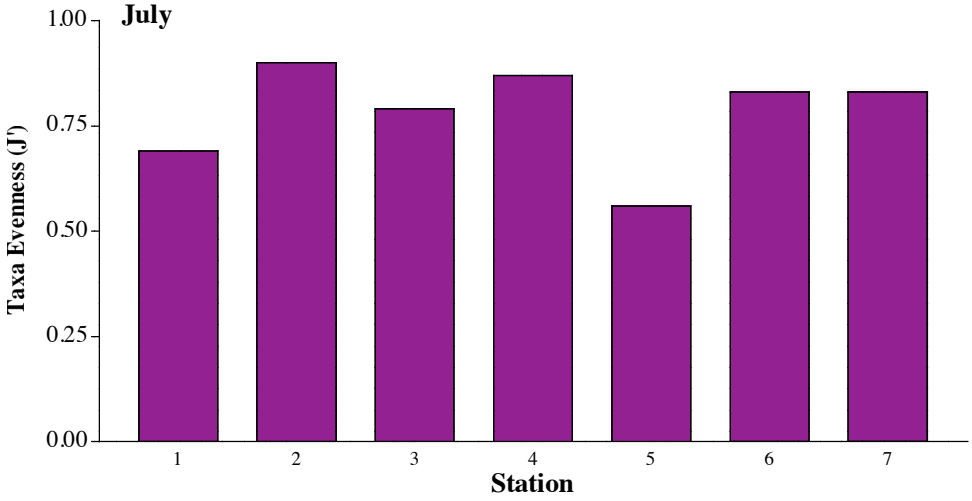


Figure 8. Taxa evenness (J') for the NOAA St. John's River stations, 2001-2002.







APPENDICES

QUALITY ASSURANCE STATEMENT

Client/Project: NOAA

Work Assignment Title: St. John's River HAB

Task Number: Opt 2-1

Description of Data Set or Deliverable: 42 Benthic macroinvertebrate samples collected 11/01, 3/02; Young Dredge grabs

Description of audit and review activities: Judged accuracy rates were well above standard levels for sorting and taxonomy. Laboratory QC reports were completed. Copies of QC results follow (see attachment.) All taxonomic data were entered into computer and printed. This list was checked for accuracy against original taxonomic data sheets.

Description of outstanding issues or deficiencies which may affect data quality: None

_____

Signature of QA Officer or Reviewer Date

_____

Signature of Project Manager Date

QUALITY CONTROL REWORKS

Client/Project: NOAA-St. John's River HAB Study-11/01 & 3/02
Task Number: Opt 2-1

Sorting Results:

Sample #	% Accuracy
SJ01305-3	100%
SJ01306-1	100%
SJ01305-2	100%
SJ01301-2	100%
SJ01307-3	100%
SJ02104-3	100%
SJ02106-2	100%
SJ02106-3	100%
SJ02104-1	100%
SJ02103-3	100%

Taxonomy Results:

Sample #	Taxa	% Accuracy
SJ01305-2	Crust./Moll.	100%
SJ01302-3	Crust./Moll.	100%
SJ02101-3	Crust./Moll.	100%
SJ02106-2	Crust./Moll.	100%
SJ01205-3	Crust./Moll.	100%
SJ01303-1	Poly./Misc.	99%
SJ02105-3	Poly./Misc.	100%
SJ02107-1	Poly./Misc.	100%
SJ01303-3	Poly./Misc.	100%

Description of outstanding issues or deficiencies which may affect data quality: None

Signature of QA Officer or Reviewer Date

QUALITY ASSURANCE STATEMENT

Client/Project: NOAA

Work Assignment Title: St. John's River HAB

Task Number: Opt 2-2

Description of Data Set or Deliverable: 21 Benthic macroinvertebrate samples collected July, 2002; Young Dredge grabs

Description of audit and review activities: Judged accuracy rates were well above standard levels for sorting and taxonomy. Laboratory QC reports were completed. Copies of QC results follow (see attachment.) All taxonomic data were entered into computer and printed. This list was checked for accuracy against original taxonomic data sheets.

Description of outstanding issues or deficiencies which may affect data quality: None

_____

Signature of QA Officer or Reviewer Date

_____

Signature of Project Manager Date

QUALITY CONTROL REWORKS

Client/Project : NOAA-St. John's River HAB Study-7/02
Task Number: Opt 2-2

Sorting Results:

Sample #	% Accuracy
SJ0203-2	100%
SJ0206-1	100%
SJ0203-1	100%
SJ0202-1	100%
SJ0205-2	100%

Taxonomy Results:

Sample #	Taxa	% Accuracy
SJ0205-3	Crust./Moll.	100%
SJ0204-1	Crust./Moll.	100%
SJ0205-1	Poly./Misc.	100%
SJ0205-3	Poly./Misc.	100%

Description of outstanding issues or deficiencies which may affect data quality: None

Signature of QA Officer or Reviewer Date